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ABSTRACT

Two studies were conducted on the effects of multiage classrooms. The first study investigated verbal interaction among children of different age groups and student-teacher interaction in multiage classrooms. Existing multiage classrooms in various settings were observed and information was recorded on the ages of the children initiating and receiving each interaction, the number of children in each age group who initiated interactions to the teacher, and the number of children in each age group who were present in the classroom. Interactions were classified as dominant, submissive, or neutral. Results indicate: (1) older children tended to initiate proportionately more interactions when three ages were grouped together, but not when only two ages were grouped together: (2) children of one age did not dominate the teacher's attention: (3) interaction within age groups was high and interaction between age groups was low when three age groups were present, but not when two age groups were present: and (4) no differences were found between the observed and expected number of interactions of various types initiated by children of various ages. The second study explored the effects of multiage grouping on achievement and self-concept. Children in multiage and and single age classrooms were given the Comprehensive Tests of Basic Skills for reading, math, language arts and study skills, and the Piers-Harris Children's Self-Concept Scale. There were no significant differences in the effects of sex or the interaction of classroom type and sex for the total self-concept scores or for any of the self-concept factor scores. Multiage classrooms had a higher mean score than single-age classrooms on the happiness and satisfaction factor. There were no significant differences for any of the achievement variables. (Author/SS)

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THE EFFECTS OF MULTIAGE GROUPING ON VERBAL INTERACTION, ACHIEVEMENT AND SELF-CONCEPT

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THE EFFECTS OF MULTIAGE GROUPING ON VERBAL INTERACTION, ACHIEVEMENT AND SELF-CONCEPT

INTRODUCTION

This paper is the result of two separate studies I conducted on the effects of multiage grouping. The first study was an analysis of verbal interaction in multiage classrooms and the second study explored the effects of multiage grouping on achievement and self-concept.

Multiage grouping, sometimes referred to as multigrading, is a classroom organizational structure in which children of different ages are placed together in classrooms without consideration of their levels of ability or achievement. A typical multiage classroom spans two or three years although occasionally more ages are grouped together. Multiage grouping is often used in secondary schools, particularly for small elective classes, but it is unusual to find multiage classes at the elementary level. Multiage classrooms were common in the educational history of this country's rural areas where this classroom structure has been affectionately referred to as the "old country school." Multiage grouping seldom has been seen in modern city and suburban schools. Recently some of these modern schools have been experimenting with a variety of elementary classroom organizational structures, one of which is multiage grouping.

It should be understood that multiage grouping is not contingent upon any particular educational theory or practice but refers only to the classroom organizational structure. Under this structure, a child entering a multiage classroom would typically remain with this classroom for the two or three years that the classroom spans. As an example, a six-year old entering a classroom of six-, seven- and eight-year olds would be expected to remain with this classroom until he/she was nine-years old.

Proponents of multiage grouping (1, 2) argue that it increases children's security because the academic setting remains stable for the two or three years that a child remains in one classroom. They contend that multiage grouping fosters

the socialization of the younger children who are joining an established group of children, a group in which the younger children may already have experienced friends. Another beneficial effect attributed to multiage grouping is the mutual aid which children consciously or unconsciously give to each other. The leadership skills of older children, supporters say, are fostered as they help the younger children. The younger children, in turn, are supposed to learn from the older ones. It should be pointed out that these are British authors and they consider multiage grouping to be tied to the open school philosophy with its emphasis on an integrated day where children are allowed to select activities and projects.

Other authors (3, 4, 5, 6, 7) see multiage grouping as providing the climate for individualized learning. Stehney (6) states that the philosophy behind multiage grouping is that a wide range of differences leads to a richer environment. Wolfson (7) states that the purposes of multiage grouping are to encourage teachers to move away from the idea of a predetermined, sequential curriculum that is relatively the same for all children in the class, to help teachers see children as individuals, and to move unnecessary restrictions on the level and direction of children's learning. These authors emphasize the many affective benefits a multiage grouping structure can provide. They do point out that providing the climate will not in itself result in all the argued benefits. Rather, the organizational structure allows teachers to provide for individual differences and to provide a flexible program but it will not guarantee that teachers will provide them.

There are some underlying assumptions which are related to these arguments. For example, it is assumed that teachers of multiage classes provide an environment in which children are allowed to choose with whom they wish to interact. Once given this choice, it is assumed that children in multiage classrooms will interact with one another across age groups. It is also assumed that student-teacher interactions will occur without regard to the age of the children.

VERBAL INTERACTION IN MULTIAGE CLASSROOMS

The purpose of the first study was to analyze the verbal interactions of children assigned to multiage classrooms. Specifically, the study investigated whether children of a particular age group in a multiage classroom interacted with other children across age groups and the types of interactions each age group displayed. It also investigated student-to-teacher interactions and student-to-student interactions to see if interactions initiated by children are distributed across age groups.

The only study found in the literature which focused on the verbal interactions of children in multiage classrooms was one by Day and Hunt (8). These researchers analyzed the communication that occurred in four multiage grouping settings composed of four-, five-, and six-year-olds. From this study it appears that simply grouping children together heterogeneously by age does not necessarily result in interactions occurring across age groups. Day and Hunt (8) did find the student-to-teacher interactions to be random in all of the settings.

The interactions of children in multiage classrooms needed to be explored further. The interactions of children in multiage grouping arrangements other than four-, five-, and six-year-olds had yet to be explored. These arrangements would include multiage classrooms composed of older children and classrooms where children of two ages are grouped together. Information was needed on the type of interactions initiated by children of various ages. Information was also needed to learn whether a particular age group dominates classroom conversation. The first study, which examined the interactions of children in a variety of multiage grouping arrangements, addressed itself to five questions:

1. In multiage classrooms is there a difference in the amount of interaction initiated by children of different age groups to other children?

It might be speculated that in multiage classrooms there would be a difference in the amount of conversation initiated by children of various ages.

The children who had been in a particular multiage classroom for the second or the third year might have more confidence than the children who were newcomers to the teacher and the classroom setting.

2. In multiage classrooms is there a difference in the amount of interaction initiated by children of different age groups to the teacher?

The first question explored interactions directed to other children. The second question explored interactions directed to the teacher. The Day and Hunt (8) study of multiage classrooms composed of four-, five-, and six-year-olds found no differences between the observed and the expected frequencies for student-to-teacher interactions. When four-, five-, and six-year-olds were combined, children in no one group dominated the teacher's attention. This study examined this question for other multiage classroom arrangements.

3. In multiage classrooms do children of each age interact with other children across age groups?

The first question was directed at analyzing the conversation initiated by all children in multiage classrooms to see whether it is randomly distributed across age groups. The possibility that a particular age group, the oldest children perhaps, might be initiating most of the conversation in multiage classrooms was explored. The third question examined each age group separately to learn whether the conversation initiated by the age group under examination was randomly directed to other children across age. In a classroom of nine-, ten-, and eleven-year-olds, are the interactions initiated by the nine-year-olds directed randomly to the other nine-, ten-, and eleven-year-olds?

The Day and Hunt (8) study of multiage classrooms composed of four-, five-, and six-year-olds found high interaction within age groups and low interaction between age groups. The four-year-olds in their study directed a greater proportion of their conversation to other four-year-olds than to five- or six-year-olds. This study examined this question for other multiage classroom arrangements.

4. Can the interactions between children be classified into definable types?

One argument for multiage grouping presented by Ridgway and Lawton (2) was the help children give one another. These researchers describe the teaching that the older children provide for the younger children. In the first study, an attempt was made to classify the interactions of children in some meaningful way that would take into account the giving and the receiving of advice and assistance. If it was possible to classify the interactions of children, the types of interactions in multiage classrooms could then be studied.

5. In multiage classrooms is there a difference in the proportion of the types of interactions initiated by students of various ages to other students?

If the interactions of children could be classified in some way to show the giving and the receiving of assistance, it would be possible to learn whether the older children were giving advice and assistance and the younger children were receiving it.

Definition of Terms

In this study, an interaction was defined as a verbal exchange between two children or between a child and the teacher. A complete interaction included the first remark by the initiator and the corresponding response by the receiver. Two widely used and widely understood nonverbal actions were considered to be part of an interaction. These nonverbal actions were the negative and the positive head shakes. The act of supplying a requested object was also included as part of an interaction.

Populations

This study was conducted in two school settings. Each setting had a variety of multiage grouping arrangements for children three through eleven years of age.

The first setting was a laboratory school on a college campus. Ten percent of the children had parents who taught at the college. At the time this study was conducted, multiage grouping had been in effect at this school for seven years.

Several special programs were being demonstrated in this laboratory school, and the philosophy of the staff generally favored open education.

The second setting was a suburban school district in another locality. There were four elementary schools in this school district, and each school had single-grade as well as multiage (multigrade) classrooms. Sixteen of the twenty-nine elementary-school classrooms in this school district were multiage classrooms.

The data for this study were collected in family rooms made up of children of two or three ages. Table 1 shows the configuration of multiage classrooms used in this study.

Procedures

Two forms were developed to record information on children's interactions. On the forms, observers could record information on the ages of the children initiating and receiving each interaction, the number of children in each age group who initiated interactions to the teacher and finally, the number of children in each age group who were present in the classroom. Two observers were trained to record the interactions of children verbatim. Observer agreement was almost 100 percent, once the observers were trained.

Each classroom was observed for thirty minutes. A time schedule was arranged with each teacher so that observers could be present to collect data during classroom activities that allowed children to interact freely. The children tended to cluster in small groups to work on some activity. When there were more than two clusters, the observers chose the clusters that had the largest number of children, and each observer observed a separate cluster. Observers did not have difficulty recording all the conversation in a cluster because the children were busy working together and conversation was slower and more structured than that of children in a social setting. Most classrooms were observed three separate times. The other classrooms were observed twice.

Through the study I hoped to learn whether children's interactions can be classified on the basis of the giving and the receiving of advice and assistance. Three categories were devised. These categories are "dominant interactions," "submissive interactions," and "neutral interactions."

In a dominant interaction, the initiator gave a command or unsolicited help and got acquiescence or a neutral response from the receiver:

Initiator: You are not doing that right.
Receiver: How should it be done? (or) Why not?

In a submissive interaction the initiator asked for help from the receiver and got advice, or help, or a neutral response from the receiver:

Initiator: Can you help me with this?
Receiver: Okay.

A neutral interaction may have been one of three types. In one type, the initiator gave a command or unsolicited help but did not get acquiescence from the receiver. In another type of neutral interaction, the initiator asked for help from the receiver but did not get advice or help from the receiver. Verbal exchanges that did not fit into the other two categories were also classified as neutral interactions:

Initiator: We are supposed to do it this way.
Receiver: No, we're not.

Initiator: How are we supposed to do this?
Receiver: I don't know.

Initiator: My cat had kittens last night.
Receiver: Kittens are cute.

Four judges classified the recorded interactions between children. When each judge, working individually, had classified all recorded interactions, the results were summarized. If all the judges or three of the four judges had agreed on a classification, the interaction was labeled according to that classification. For example, if three judges classified an interaction as "dominant" and one judge classified the interaction as "neutral," the interaction was labeled as a "dominant" interaction. If three or more judges could not agree

on a classification for an interaction, the interaction was considered unclassifiable.

A pilot test was made based on interactions collected in two classrooms not used in the study. The pilot test revealed that there was enough agreement among judges to warrant use of the classification system as defined. The judges then proceeded to classify all the recorded interactions, and the data were processed as described here.

It was decided that if the judges agreed on the classifications of at least three-fourths of the interactions the system would be considered usable. If 75 percent or more of the interactions were classifiable, the data related to the fifth question would be analyzed.

Results and discussion

In this study I sought to learn whether children of one age dominated the classroom conversation in multiage classrooms. The study examined conversation directed to other children in the classroom as well as conversation directed to the teacher. The results are presented in Tables 2 and 3.

When children of two ages were grouped together in a classroom, few differences were found between the observed and the expected number of interactions initiated by children of various ages to other children in the classroom. Even when significant differences were found, the results were close to the .01 significance level designated for this study. The results did not produce a consistent pattern: They did not show that older children dominated the conversation. When three ages were grouped together in a multiage classroom, a pattern emerged. In this classroom structure, the older children tended to initiate more interactions to other children than would be expected from their representation in the classroom. This pattern did not appear in the suburban setting in classrooms composed of eight-, nine-, and ten-year-olds nor in the laboratory school classrooms of six-, seven-, and eight-year-olds. In these three-age classroom combinations where the conversation was random across ages,

it may have been the teachers in these classrooms who made a special effort to insure the interaction across ages.

In summary, when three ages were combined in a classroom, the older children tended to dominate the conversation directed to other children in the classroom. This tendency was not present when children of two ages were combined in a classroom.

When interactions directed at the teacher were examined, only one significant difference was found between the observed and the expected number of interactions initiated by children of various ages. For the one significant difference the result was close to the .01 significance level designated for this study. This finding was consistent for all multiage classroom arrangements and for both settings of the study -- the laboratory school and the suburban schools. The finding was also consistent with the results from the Day and Hunt (11) study. When children of different ages are combined in classrooms, children of one age do not dominate the teacher's attention.

This study explored the interaction of children of each age across age groups. In each multiage classroom arrangement, each age group was examined separately to see whether the age under examination initiated conversation randomly across age groups. The results are presented in Tables 4 and 5.

When children of two ages were combined in a classroom, children from each of the two age groups initiate conversation randomly across age groups. However, when children from three age groups were combined in a classroom, little interaction occurred across age groups. This result is most evident for the oldest and the youngest children in these classrooms. When conversation across age lines did occur, it was usually initiated by children in the middle age group. The children in the middle age group are the only children in this arrangement who were never more than one year's difference in age from any of the other children. An examination of the observed and the expected frequencies for these data reveals high interaction within age groups and low interaction between

age groups. Day and Hunt (8) reported similar results for multiage classrooms composed of four-, five-, and six-year-olds.

In summary, in multiage classrooms composed of children from two age groups interaction across age groups was random. In multiage classrooms composed of three age groups interaction within age groups was high and interaction between age groups was low. Only the children in the middle age tended to interact randomly across age groups. Grouping children of different ages together in a classroom can result in interaction across age groups. However, interaction across age groups will not necessarily occur when children of three ages are grouped together. The least interaction will occur between the youngest and oldest children.

Teachers with pupils of three ages may be contributing, consciously or unconsciously, to the clustering of children into single age groupings. If these teachers have a preconceived notion of what children of a certain age should learn, instruction may be geared to developing certain skills in each age group. As a consequence, children of a single age may be clustering to work on certain types of classroom activities requiring these special skills. Apparently when three ages are grouped together, teachers must take special care to provide a conducive climate and encourage interaction across age groups.

Finally, this study attempted to classify the interactions of children according to advice and assistance given or requested so that types of interactions could be examined in multiage classrooms. Although there were problems in using the classification system, 80 percent of the children's interactions were easily classifiable. The remaining 20 percent of the verbal exchanges posed problems in classification. Two types of missing information appeared to cause most of the classification problems: the voice inflections associated with an interaction and the conversational setting associated with an interaction. The conversational setting of an interaction is the previous conversation between two children that related to the interaction being classified. Both types

of information were absent when the judges were classifying interactions. For 80 percent of the interactions this information was unnecessary, but for the remaining 20 percent each judge had to interpret the voice inflections or the conversational setting without any information about them. Perhaps the data should be tape recorded. Each interaction could be presented to the judges on tape along with other conversation directly related to the interaction. This classification system posed problems, but it did seem to have possibilities.

The classifiable data were used to examine the types of interactions initiated by children of various ages, and the results are presented in Table 7. No differences were found between the observed and the expected number of interactions of various types initiated by children of various ages. This finding was consistent for all the multiage classroom arrangements and for both settings of the study -- the laboratory school and the suburban schools. The unclassifiable interactions might have had an effect on this finding if they could have been included. The large proportion of submissive and dominant interactions seems to indicate that children were helping one another. However, the older children were not giving advice and assistance more frequently than the younger children. Conversely, the younger children were not requesting advice and help more frequently than the older children. This may be a positive outcome of multiage grouping: children of any age feel comfortable giving help in areas in which they have expertise to children of any age in the classroom. However, classrooms composed of three age groupings have high interaction within age groups and low interaction between age groups. As a result, much of the mutual aid is probably between children of the same age.

These were the findings from the first multiage study. The second study explored the effect of multiage grouping on achievement and self-concept.

THE EFFECTS OF MULTIAGE GROUPING ON ACHIEVEMENT AND SELF-CONCEPT

The research on multiage grouping has focused primarily on reading and mathematics achievement and on various affective measures. The conclusions from some of these studies seem unwarranted because of troublesome research designs. These authors (9, 10, 11, 12) either failed to submit their data to any data analysis technique or failed to indicate the type of data analysis technique used. One study on multiage grouping (13) did perform analysis of variance on data composed of a complete multiage group, a restricted multiage group and a control group. The conclusion that the two multiage groups scored higher on six of the seven self-concept measures seems unwarranted since there is no indication that a multiple comparison procedure was used to determine exactly where the significant differences were among the three groups. The differences may have been between the two types of multiage grouping arrangements rather than between the multiage grouping arrangements and the control group. Another study report (14) inferred that there were considerable school size differences between the multiage schools and the single-age schools studied. Furthermore, the multiage arrangements within the multiage schools were not reported. While grades three and five were studied, it is not known whether these third and fifth graders were in classrooms with two grades combined or three grades combined or whether these children were the youngest or oldest in the classrooms.

With one exception, the remaining studies that examined academic achievement in multiage and single-age classrooms found no differences between these two types of classroom arrangements (15, 16, 17, 18, 19, 20, 21). When variables related to affective development were studied, multiage classrooms were either higher on the affective measures examined or were not significantly different from single-age classrooms on the affective measures (15, 17, 19, 20, 21, 22). It should be noted that most of the study settings were not in typical U.S. public schools. The setting for the Mycock (15) study was the British Infant

Schools and the Hoen (17) study used low achieving children in Canada. The subjects in the Papay, Costello, Hedl and Spielberger (19) study were disadvantaged children in a Title I program while the Chace (16) study used a laboratory school for the multiage classrooms and public schools for the single-age classrooms. The Runyon (21) study focused on gifted first graders in multiage and single-age classrooms. Two of the studies (15, 19) focused on only first and second graders and Hoen (17) used only third graders. The study described in this paper explored the effects of multiage grouping on achievement and self-concept in a typical suburban public school setting in the United States. The study included multiage classrooms of both two ages combined and three ages combined and the children ranged in age from six to ten years. The purpose of this study was to determine if this typical public school setting would produce results consistent with the special setting results reported in the literature.

Procedures

The setting for this study was three elementary schools in a suburban school district. Each of these elementary schools had both single-age and multiage classrooms. The multiage classrooms were in their third year of operation when this study was conducted. The multiage groups included classrooms of six- and seven-year-olds, classrooms of eight- and nine-year-olds, classrooms of nine- and ten-year-olds, and classrooms of eight-, nine-, and ten-year-olds. All of the multiage classrooms in the three elementary schools for a total of 135 children were included in the study and two randomly selected single-age classrooms were used for each single-age grouping for a total of 231 children. Table 8 shows the number of children included in the study for each age and age combination.

The Comprehensive Tests of Basic Skills provided the achievement data for this study. Total scores in reading, mathematics, language arts and study skills were used for the study. Self-concept was measured using the Piers-Harris Children's Self-Concept Scale.

This scale is an 80 item self-report instrument designed for elementary children. The items are written as simple descriptive statements, such as "I am a happy person," with a yes/no response. The instrument produces a total score plus scores on six factors: behavior, intellectual and school status, physical appearance and attributes, anxiety, popularity, and happiness and satisfaction.

Achievement and self-concept data were collected in both multiage and single-age classrooms in each of the three elementary schools used in the study. The achievement battery was administered to all children seven through ten years of age by the school district as part of their regular testing progarm. Achievement data were not available for the six-year-olds. The self-concept instrument was administered by reading each item to the children so that reading abilities would not affect the scores.

A 2 x 2 analysis of variance factorial design was used to analyze the data. The two experimental variables were type of classroom (multiage or single-age) and sex. The dependent variables were total reading score, total mathematics score, total language arts score, total study skills score, total self-concept score, and scores for each of the six self-concept factors. The .05 level of significance was utilized for all of the statistical tests.

Results

Table 9 shows the results for each analysis of variance. There were no significant differences on the effects of Classroom Type, Sex or the interaction of Classroom Type and Sex for any of the achievement variables. An examination of the F-values shows that none of them even approached the significance level designated for this study.

There were no significant differences on the effects of Sex or the interaction of Classroom Type and Sex for the total self-concept scores or for any of the self-concept factor scores. The effect, Classroom Type, produced a significant difference on the factor labeled happiness and satisfaction. The

multiage classrooms had a higher mean score on this factor than did the single-age classrooms. Children in the multiage classrooms had slightly but consistently higher scores on each of the other factors and on total self-concept although the analysis of variance did not produce significant differences at the .05 significance level. While the effect, Sex, did not produce any significant differences for any of the self-concept scores, the girls had higher mean scores on all but one of the self-concept factors and on total self-concept.

Conclusions

The purpose of this study was to explore the effects of multiage grouping on achievement and self-concept. No significant differences were found between children in multiage and single-age classrooms on any of the achievement measures examined. The self-concept measure produced a significant difference between children in multiage and single-age classrooms on the factor labeled happiness and satisfaction with the multiage classrooms having a higher mean score on this factor. While the children in multiage classrooms had consistently higher mean scores than the single-age classroom children on each of the other factors and on the total self-concept score, the differences were not significant. The results of this study are consistent with those found in the literature. This study varied from most previous studies in that it was conducted entirely in a public school setting with a general population of children. The research results for this typical school setting are similar to those found with special groups as reported in the literature.

Multiage grouping skeptics have always been fearful that achievement will suffer when children of different ages are in a multiage classroom. The results from both this study and previous studies indicate that this fear is unfounded. Achievement in multiage classrooms is no different from achievement in single-age classrooms.

From this study, the higher scores for children in multiage classrooms on the happiness and satisfaction factor seem to indicate that multiage classrooms provide an atmosphere of contentment. While multiage classrooms do not appear to affect the achievement of children attending them, they do appear to be happy environments for children to learn. If multiage classrooms are providing the climate for individualized learning as suggested by some multiage grouping proponents, perhaps the benefits are largely in the affective domain. Children do not learn more but learning is occurring in a happier environment. Joy in the process of learning is certainly a worthy goal for education.

TABLE 1

CONFIGURATION OF MULTIAGE CLASSROOMS

Classroom Combination by Age		Number of Classrooms Studied
Laboratory School Setting		
3-4-5 year olds		2
6-7-8 year olds		2
9-10-11 year olds		2
	Total	6
Suburban School Setting		
6-7 year olds		5
8-9 year olds		2
9-10 year olds		3
8-9-10 year olds		5
	Total	15

TABLE 2

ONE-SAMPLE TEST CHI SQUARE VALUES FOR INTERACTIONS INITIATED BY CHILDREN IN TWO-AGE CLASSROOMS

Classroom Composition	Interactions to Other Children			Interactions to the Teacher		
	Chi Square Value	Number of Interactions	Degrees of Freedom	Chi Square Value	Number of Interactions	Degrees of Freedom
Suburban School Setting						
6-7 year olds	7.08*	146	1	2.48	69	1
8-9 year olds	3.00	162	1	0.38	96	1
9-10 year olds	2.88	122	1	4.01	69	1
Combination of all youngest-oldest children in two-age classrooms	0.46	430	1	1.40	234	1

*$p < .01$

TABLE 3

ONE-SAMPLE TEST CHI SQUARE VALUES FOR INTERACTIONS INITIATED BY CHILDREN IN THREE-AGE CLASSROOMS

Classroom Composition by Age	Interactions to Other Children			Interactions to the Teacher		
	Chi Square Value	Number of Interactions	Degrees of Freedom	Chi Square Value	Number of Interactions	Degrees of Freedom
Laboratory School Setting						
3-4-5 year olds	35.38*	335	2	0.98	147	2
6-7-8 year olds	8.72	253	2	7.14	88	2
9-10-11 year olds	18.51*	220	2	10.80*	122	2
Combination of all youngest-middle-oldest children in Laboratory School	66.69*	808	2	4.16	357	2
Suburban School Setting						
8-9-10 year olds	1.93	220	2	1.90	95	2

*p < .01

TABLE 4

ONE-SAMPLE TEST CHI SQUARE VALUES FOR INTERACTIONS DIRECTED TO CHILDREN BY EACH AGE IN TWO-AGE CLASSROOMS

Interactions Initiated by Children in:	Classroom Composition by Age	Chi Square Value	Number of Interactions	Degrees of Freedom
Suburban School Setting				
6 year olds	6-7 yr. olds	1.29	50	1
7 year olds	6-7 yr. olds	4.21	96	1
8 year olds	8-9 yr. olds	1.05	96	1
9 year olds	8-9 yr. olds	0.56	64	1
9 year olds	9-10 yr. olds	0.12	35	1
10 year olds	9-10 yr. olds	1.25	87	1
Combination of all the youngest children in two-age classrooms		6.47	181	1
Combination of all the oldest children in two-age classrooms		5.93	247	1

TABLE 5

ONE-SAMPLE TEST CHI SQUARE VALUES FOR INTERACTIONS DIRECTED TO CHILDREN BY EACH AGE IN THREE-AGE CLASSROOMS

Interactions Initiated by Children in:	Classroom Composition by Age	Chi Square Value	Number of Interactions	Degrees of Freedom
Laboratory School Setting				
3 year olds	3-4-5 yr. olds	8.60	20	2
4 year olds	3-4-5 yr. olds	3.16	73	2
5 year olds	3-4-5 yr. olds	78.00*	239	2
6 year olds	6-7-8 yr. olds	18.64*	37	2
7 year olds	6-7-8 yr. olds	7.66	73	2
8 year olds	6-7-8 yr. olds	26.18*	147	2
9 year olds	9-10-11 yr. olds	3.90	56	2
10 year olds	9-10-11 yr. olds	37.41*	88	2
11 year olds	9-10-11 yr. olds	17.47*	75	2
Combination of all the youngest children in the laboratory school classrooms	All Classrooms	23.94*	113	2
Combination of all the middle age children in the laboratory school classrooms	All Classrooms	2.59	234	2
Combination of all the oldest children in the laboratory school classrooms		148.84*	461	2
Suburban School Setting				
8 year olds	8-9-10 yr. olds	12.65*	83	2
9 year olds	8-9-10 yr. olds	19.63*	77	2
10 year olds	8-9-10 yr. olds	13.35*	61	2

*p < .01

TABLE 6

CONTINGENCY TABLE CHI SQUARE VALUES FOR TYPES OF INTERACTIONS INITIATED BY CHILDREN IN TWO-AGE CLASSROOMS

Classroom Composition by Age	Chi Square Value	Number of Interactions	Degrees of Freedom
Suburban School Setting			
6-7 year olds	2.38	121	2
8-9 year olds	5.30	134	2
9-10 year olds	2.44	91	2
Combination of all the youngest-oldest children in two-age classrooms	3.08	346	2

TABLE 7

CONTINGENCY TABLE CHI SQUARE VALUES FOR TYPES OF INTERACTIONS INITIATED BY CHILDREN IN THREE-AGE CLASSROOMS

Classroom Composition by Age	Chi Square Value	Number of Interactions	Degrees of Freedom
Laboratory School Setting			
3-4-5 year olds	3.50	277	4
6-7-8 year olds	10.20	203	4
9-10-11 year olds	4.78	183	4
Combination of all youngest-middle-oldest children in the laboratory school	7.28	663	4

TABLE 8

NUMBER OF CHILDREN INCLUDED IN STUDY FOR EACH AGE AND AGE COMBINATION

Age/ Age Combination	Grade/ Grade Combination	Number of Children
6	1	42
7	2	48
8	3	46
9	4	47
10	5	48
6-7	1&2	63
8-9	3&4	22
9-10	4&5	26
8,9,10	3,4,5	24
Total		366

TABLE 9

ANALYSIS OF VARIANCE FOR CLASSROOM TYPE AND SEX ACROSS ACHIEVEMENT AND SELF-CONCEPT VARIABLES

Source of Variation	Degree of Freedom	Classroom Type		Sex		Classroom Type X Sex	
		F-Value	Probability	F-Value	Probability	F-Value	Probability
Reading Achievement	1,339	.00	.91	.05	.82	.14	.71
Mathematics Achievement	1,339	.06	.79	.00	.91	.00	.92
Language Arts Achievement	1,339	.00	.92	.39	.54	.10	.75
Study Skills Achievement	1,339	.01	.90	.07	.78	.25	.63
Total Self-Concept Scores	1,372	2.46	.11	2.38	.12	.17	.69
Behavior Factor	1,372	1.73	.19	2.32	.12	.45	.51
Intellectual and School Status Factor	1,372	1.74	.19	1.67	.19	1.11	.29
Physical Appearance and Attributes Factor	1,372	2.36	.12	2.84	.09	1.19	.28
Anxiety Factor	1,372	1.59	.21	2.69	.10	.01	.89
Popularity Factor	1,372	1.35	.24	2.81	.09	.33	.57
Happiness and Satisfaction Factor	1,372	5.35	.02*	3.22	.07	.03	.85

*p < .05

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